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National Cancer Institute (NCI)

North American Association of Central Cancer Registries (NAACCR)

Centers for Disease Control and Prevention (CDC)

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Annual Report to the Nation on the Status of Cancer, 1975-2005, Featuring Trends in Lung Cancer, Tobacco Use, and Tobacco Control: Questions and Answers

Key Points

- For the first time in the history of this report, both incidence and death rates for all cancers combined decreased for both men and women.
- Incidence rates for all cancers combined decreased 0.8 percent per year from 1999 through 2005 for both sexes. (Question 4)
- Death rates decreased, on average, 1.8 percent per year from 2002 through 2005. (Question 6)
- Among men, lung cancer incidence and death rates have been decreasing since the early 1990s. Among women, however, lung cancer incidence rates have been increasing since 1975, although at a slower rate, and death rates have recently stabilized (2003 through 2005). (Questions 10-13)
- Marked geographic variability was seen in the trends in lung cancer incidence and death rates for men and women. Higher rates and slower declines were seen in the South and the Midwest. Among men, the lung cancer death rate decreased in 44 of 50 states and in the District of Columbia from 1996 through 2005, whereas among women, the lung cancer death rate decreased in only three states and increased in 13 states.

1. What is the purpose of this report and who created it?

This report provides an update of cancer incidence (new cases) and death rates and trends in these rates in the United States, as well as an in-depth analysis of a selected topic. The American

Cancer Society (ACS), the North American Association of Central Cancer Registries (NAACCR), the Centers for Disease Control and Prevention (CDC), and the National Cancer Institute (NCI), which is part of the National Institutes of Health, have collaborated annually since 1998 to create this report.

The feature section of the report describes lung cancer rates and trends, variations in tobacco use, and tobacco control across the United States.

2. What are the sources of the data?

Cancer mortality information in the United States is based on causes of death reported by physicians on death certificates and filed by state vital statistics offices. The mortality information is processed and consolidated in a national database by the CDC through the National Vital Statistics System, which covers the entire United States.

Information on newly diagnosed cancer cases occurring in the United States is based on data collected by registries in the CDC's National Program of Cancer Registries (NPCR) and NCI's Surveillance, Epidemiology, and End Results (SEER) Program. NAACCR evaluates and publishes data annually from registries in both programs. Incidence rates are for invasive cancers, except for bladder cancer, which also includes *in situ* cancer (cancer that is confined to the inner lining of the bladder).

Long-term (1975 through 2005) trends for all races for all cancer sites combined and for the 15 most common cancers were based on SEER incidence data covering about 10 percent of the U.S. population. Short-term trends (1996 through 2005) for four racial/ethnic populations (white, black, Asian/Pacific Islander, and Hispanic/Latino) by sex for all sites combined and for the 15 most common cancers were based on about 65 percent of the U.S. population. Average annual (2001 through 2005), sex-specific, and age-adjusted incidence rates were based on incidence data from 41 population-based cancer registries that cover about 80 percent of the U.S. population.

Information about adult smoking prevalence (i.e., the percentage of adults who smoke) from 1997 through 2006 by state and region was obtained from CDC's Behavioral Risk Factor Surveillance System (BRFSS). Smoking prevalence during 2004 and 2005 and trends in smoking initiation among children ages 12 through 17 were abstracted from the Substance Abuse & Mental Health Services Administration's (SAMHSA) National Survey on Drug Use and Health, and the NCI/CDC co-sponsored series of Tobacco Use Supplements to the Current Population Survey, respectively. Information on Federal and State tobacco tax and tobacco prevention spending was obtained from the Campaign for Tobacco-Free Kids.

3. Which reporting periods were chosen as a main focus of the report?

The period from 2001 through 2005 was used for describing the U.S. burden of cancer, and the period from 1996 through 2005 was used for describing trends in cancer incidence and death among the country's five major racial and ethnic populations (white, black, Asian/Pacific Islander, Hispanic/Latino, and American Indian/Alaska Native). The period from 1975 through

2005 was chosen to represent the best perspective on long -term trends in cancer incidence and death rates among all races combined.

Update on Incidence and Mortality Trends for All Cancer Sites Combined and the Top 15 Cancers

4. What is happening with cancer incidence trends overall?

After increasing from 1975 through 1992, incidence rates for all cancers combined for all sexes and populations combined were stable from 1992 through 1999 and decreased slightly from 1999 through 2005. For men, incidence rates for all cancers decreased by 4.8 percent per year from 1992 through 1995, were stable from 1995 through 2001, and decreased from 2001 through 2005. For women, incidence rates for all cancers combined decreased from 1998 through 2005 after years without any declines.

This year's analysis marks the first time the report has documented a simultaneous decline in cancer incidence and deaths rates for both men and women. Long -term incidence rates for all cancers combined decreased 0.8 percent per year from 1999 through 2005 for both sexes; the drop was steeper among men (1.8 percent per year from 2001 through 2005) than among women (0.6 percent per year from 1998 through 2005).

Incidence trends are related to screening patterns as well as to changes in risk factors. For instance, an increase in the use of the prostate specific antigen (PSA) test in the late 1980s and early 1990s led to a rapid increase in male cancer incidence rates from 1988 to 1992 due to the detection of asymptomatic prostate disease, which was then followed by a sharp decline.

In contrast with mortality, for which declines are always good news, declines in incidence may reflect good news (decreases in risk factors that cause cancer or increased use of screening tests, such as colorectal and pap tests, that can actually help prevent cancer by allowing the removal of precancerous growths) or bad news (decreased use of screening tests) or a combination of the two.

5. What is happening with incidence rates for the top 15 cancers among men and women?

Among men, incidence rates of myeloma, non -Hodgkin lymphoma, melanoma, and cancers of the liver, kidney, and esophagus increased in the most recent time period. Prostate cancer incidence rates decreased by 4.4 percent per year from 2001 through 2005, after increasing by 2.1 percent per year from 1995 through 2001. Incidence rates also decreased for cancers of the lung, colon/rectum, oral cavity, and stomach. Rates were stable for the remaining top 15 cancers (leukemia and cancers of the bladder, pancreas, and brain/nervous system) in the most recent time period.

Among women, incidence rates for non -Hodgkin lymphoma, melanoma, leukemia, and cancers of the bladder, kidney, and lung have been increasing for 30 years. Incidence rates for pancreatic cancer have been increasing since 1994, and thyroid cancer incidence rates have increased since 1980. Long -term

incidence trends showed decreases in the most recent period for cancers of the breast, colon/rectum, uterus, ovary, cervix, and oral cavity.

6. What is happening with incidence rates for breast cancer?

Breast cancer incidence rates among women decreased from 1999 through 2005 by 2.2 percent per year, in contrast to several decades of increasing or stable rates. The factors that influence breast cancer incidence are complex, including changes in reproductive risk factors, obesity, the prevalence of mammography screening, and others. Recent reports suggest that the decrease in breast cancer incidence may be related to the rapid discontinuation of hormone replacement therapy, a known risk factor for breast cancer, as well as to a decline in mammography screening prevalence.

7. What is happening with cancer mortality trends overall?

The overall decline in cancer death rates, first noted in the early 1990s, has continued through 2005. Death rates decreased on average 1.8 percent per year from 2002 through 2005, nearly twice the annual decrease of 1.1 percent per year from 1993 through 2002. This decline was slightly more pronounced among men (2 percent per year from 2001 through 2005) than women (1.6 percent per year from 2002 through 2005). Death rates are the best indicator of progress against cancer. Rates decreased for most racial and ethnic populations.

8. What is happening with death rates for the top 15 cancers among men and women?

For the most recent reporting period, which varies according to cancer type, death rates decreased for 10 of the 15 most common causes of cancer death among men (i.e., cancers of the lung, prostate, colon/rectum, kidney, stomach, brain, and oral cavity, as well as leukemia, non-Hodgkin lymphoma, and myeloma). Death rates increased for esophageal and liver cancers among men and recently stabilized for melanoma and cancers of the pancreas and bladder.

Death rates among women also decreased for 10 of the 15 most common cancers (i.e., breast, colon/rectum, stomach, kidney, cervix, brain, and bladder cancers, as well as non-Hodgkin lymphoma, leukemia, and myeloma). However, death rates among women increased for cancers of the pancreas and liver, and were stable for cancers of the ovary, uterus, and lung.

9. If cancer death rates continue to fall, does that mean the number of people dying from cancer will also continue to fall?

Not necessarily. The data described in the report are rates (number of deaths per 100,000 persons in the U.S.) and are adjusted for age, so they are comparable across various factors, such as race, time, and region. The actual number of people dying from cancer (sometimes called the “count”) can be influenced by several factors, including the growth in the number of older people in the United States (cancer is primarily a disease of aging) and the increase in size of the U.S. population.

Therefore, while the cancer death rate may go down in a given year, if there is an increase in the size and the overall age of the U.S. population that same year, the actual count of the number of cancer deaths could go up.

Trends in Lung Cancer, Tobacco Use and Tobacco Control

10. What is happening with incidence rates for lung cancer?

Overall, lung cancer incidence rates have been increasing in women since 1975, although the rate of the increase has continued to slow down over this time interval. In comparison, the lung cancer incidence rate in men has been decreasing since 1991. The difference reflects changes in smoking trends over time among men and women, with men having taken up tobacco use decades before women, who began to smoke in large numbers after World War II. (see Question 17).

11. How do lung cancer incidence rates differ by geographic region?

The report shows substantial variation in lung cancer incidence rates across states and geographic regions, with the lowest rate found in Utah (39.6 per 100,000 men and 22.4 per 100,000 women) and the highest in Kentucky (136.2 per 100,000 men and 76.2 per 100,000 women).

There were striking variations in lung cancer incidence trends by sex. Among the 28 states in which incidence trends could be measured, male lung cancer incidence rates decreased in all but four states (Nebraska, Hawaii, Idaho, and Utah) from 1996 through 2005. In contrast, lung cancer incidence among women decreased in only one state (California) and increased in eight states (Pennsylvania, Illinois, Iowa, Michigan, Minnesota, Nebraska, Kentucky, and Idaho).

12. What is happening with death rates for lung cancer?

Lung cancer death rates among women stabilized during the period from 2003 through 2005 after increasing from 1975 through 2003. Among men, lung cancer death rates have been decreasing since the 1990s.

13. How do lung cancer death rates differ by geographic region?

The report shows substantial variation in lung cancer death rates across states and geographic regions, particularly among women. Similar to incidence rates, the lowest mortality was found in Utah (33.7 per 100,000 men and 16.9 per 100,000 women), and the highest mortality was found in Kentucky (111.5 per 100,000 men and 55.9 per 100,000 women).

Among men, while the lung cancer death rate has been decreasing nationally since the 1990s, the rate of decrease has varied substantially across states and geographic regions. In California, for example, the average percentage decrease from 1996 through 2005 was about 2.8 percent per year, which is twice as

much as in many states in the Midwestern and Southern United States. The lung cancer death rate among men decreased in 44 of the 50 States and in the District of Colombia from 1996 through 2005.

In contrast, the death rate among women decreased in only three states (California, New Jersey, and Texas) and increased in 13 States (Alabama, Arkansas, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Kansas, South Dakota, Indiana, Michigan, and Iowa).

14. How do smoking rates differ by geographic region?

Consistent with both lung cancer incidence and death rates by state, smoking prevalence was lowest in Utah (10.4 percent of men and 9.3 percent of women) and highest in Kentucky (29.1 percent of men and 28.0 percent of women). From 1997 through 2006, adult smoking prevalence decreased in 29 states for men and 30 states for women. States with the largest improvement in smoking rates include Connecticut, California, Nevada, Utah, and Washington. Smoking rates remained stable in all remaining states except Mississippi, where it increased one percent per year for women.

Smoking prevalence during 2004 and 2005 among youth ages 12 to 17 ranged from 7.1 percent in the District of Colombia to 17.2 percent in Kentucky.

15. What are the possible causes of higher lung cancer incidence and death rates in certain regions?

State variation in smoking prevalence is a prominent factor. Smoking prevalence is influenced by several factors, including public awareness about the harmful health effects of tobacco use, social norms about tobacco use, educational levels, race and ethnicity, tobacco control activities, and industry promotion activities. Previous research has shown that comprehensive tobacco control programs, including the use of excise taxes, can achieve substantial reductions in tobacco use. California, which was the first state in the U.S. to implement a comprehensive state-wide tobacco control program, has made the greatest progress in reducing tobacco use, while many states in the South and Midwest continue to have a high prevalence of smoking and low excise taxes.

16. What percentage of cancer deaths is attributable to smoking?

According to the U.S. Surgeon General, cigarette smoking accounts for approximately 30 percent of all cancer deaths in the United States, with 80 percent of smoking-related cancer deaths due to lung cancer. Other cancers caused by smoking include cancers of the oral cavity, pharynx, larynx, esophagus, stomach, bladder, pancreas, liver, kidney, and uterine cervix, as well as myeloid leukemia. Smoking is also associated with deaths from cardiovascular and respiratory disease.

17. What are some of the reasons for gender differences in lung cancer rates?

Historically, lung cancer rates among men have been substantially higher than those among women because men started smoking much earlier than women. Although men began smoking in the early 20th century, with large peaks of adoption during World Wars I and II, the adoption of smoking among

women took off during and after World War II. During the late 1960s and 1970s, with changing social norms and cigarette brands aggressively marketed to women, there was a sharp increase in smoking initiation among women, particularly among women who were adolescents and young adults at the time.

Later historical adoption of smoking by women has had an effect on lung cancer incidence rates. Among men, lung cancer incidence rates have been declining among all age groups. Among women, however, lung cancer incidence rates have continued to increase among older women (ages 75 and over), and younger women (under 50) have experienced only slight decreases in some years and increases in others.

18. How do states differ in terms of tobacco taxes and tobacco control spending?

The tobacco tax is generally lower in many Southern/tobacco growing states, including North Carolina, Kentucky, Tennessee, South Carolina, Virginia, West Virginia, Florida, Georgia, Alabama, Mississippi, and Louisiana, than it is in other regions.

Only three states, Delaware, Colorado, and Maine, meet CDC's minimum spending guidelines for comprehensive tobacco prevention programs for 2008. Thirty states and the District of Columbia failed to meet at least 50 percent of the CDC guidelines.

19. What is the American Cancer Society doing in tobacco control?

The American Cancer Society and its affiliate advocacy organization, American Cancer Society Cancer Action Network (ACS CAN), have long touted the benefits of a comprehensive approach to tobacco control policy. The authors conclude that tobacco tax increases, smoke-free laws and evidenced-based tobacco prevention and cessation programs are all measures that can collectively help to fight the nation's tobacco epidemic. ACS CAN plans to continue its efforts to combat the scourge of tobacco in the upcoming year by addressing the challenges cited in the report, such as tobacco industry promotional activities, point of sale discounts, and budget cuts that threaten tobacco control efforts in the states.

How to Read This Report

20. How are cancer incidence and death rates presented?

Cancer incidence rates and death rates are measured as the number of cases or deaths per 100,000 people per year and are age-adjusted to the 2000 U.S. standard population. When a cancer affects only one sex -- for example, prostate cancer -- then the number is per 100,000 persons of that sex. The numbers are age-adjusted, which allows for comparison of rates from different populations with varying age composition over time and in different regions. It is noteworthy that breast cancer occurs in both men and women, although it occurs less frequently in men.

21. What is annual percent change or APC

The annual percent change (APC) is the average rate of change in a cancer rate per year in a given time frame (i.e., how fast or slowly a cancer rate has increased or decreased each year over a period of years). The APC was calculated for both incidence and death rates. The number is given as a percent, such as an approximate one percent per year decrease.

A negative APC describes a decreasing trend, and a positive APC describes an increasing trend. In this report, trends are reported as increasing and decreasing only if they are statistically significant.

Data Adjustments

22. Why were incidence rates adjusted for delays in reporting incidence data to SEER?

The report presents analyses of long-term trends in cancer incidence rates with and without adjustment for reporting delays and more complete information. Adjusting for the se delays and accumulating more complete and accurate information provides the basis for a potentially more definitive assessment of incidence rates and trends in the most recent years for which data are available. Cancer registries routinely take two to three years to compile their current cancer statistics. An additional one to two years may be required to have more complete incidence data on certain cancers, such as melanoma and prostate and breast cancers, particularly when they are diagnosed in outpatient settings. Cancer registries continue to update incidence rates to include these cases. Consequently, the initial data reported for certain cancer incidence rates may be an underestimate. Long-term reporting patterns in SEER registries have been analyzed, and it is now possible to adjust site-specific incidence rates and incidence rates for all cancers combined to correct for expected reporting delays and more complete information.

23. What is joinpoint analysis and how does it account for the different time periods used for trends analysis in this report?

Joinpoint analysis is a statistical method that describes changing trends over successive segments of time and the amount of increase or decrease within each segment. This statistical method chooses the best-fitting point or points, which are called joinpoints; these points are where the rate of increase or decrease changes significantly.

Joinpoint regression analysis involves fitting a series of joined straight lines to the age-adjusted rates, and each line segment is described by an annual percent change that is based on the slope of the line segment. Each joinpoint denotes a statistically significant change in trend. Thus, for death rates for all cancers combined among men, the slope, or trend, changes in 2001 and is reported as a two percent per year decline from 2001 through 2005. Among women, the trend changes in 2002 and is reported as a 1.6 percent per year decline from 2002 through 2005 in this report.

Joinpoint analyses were performed for incidence and mortality trends from 1975 through 2005.

24. What other data issues need to be considered?

This report uses data from the U.S. Census Bureau to calculate incidence and death rates. National and state population estimates for 2000 through 2005 are based on new, improved methodology, which might affect incidence rates at the state level. In addition, NCI had to make modifications to these estimates to account, at the county level, for changes in population due to the displacement of victims of hurricanes Katrina and Rita (2005) in the most affected counties of Louisiana, Mississippi, Alabama, and Texas.

Incidence data for 2005 may also be affected by new data sharing restrictions within the Veterans Health Administration (VHA). VHA hospitals have traditionally been a critical source of data for cancer cases diagnosed among Veterans served by those institutions. In August 2007, the Veterans Administration (VA) instituted new requirements that restrict the submission of cancer cases to central cancer registries. VA cases account for at least three percent and possibly as much as eight percent of all cancer cases diagnosed among men. Therefore, incidence rates for men may be underestimated.

25. Where is this report published?

The report is available at: <http://jnci.oxfordjournals.org>.

26. Where can I find out more about the report?

For more information, visit the following Web sites:

Annual Report to the Nation press release:

<http://cancer.gov/newscenter/pressreleases/ReportNation2008Release>

For supplemental material, please go to:

ACS: <http://www.cancer.org>. Go to

http://www.cancer.org/docroot/PED/ped_10.asp?sitearea=PED&level=1 for information on tobacco and cancer

CDC (Division of Cancer Prevention and Control): <http://www.cdc.gov/cancer>. Go to http://www.cdc.gov/tobacco/tobacco_industry for smoking and tobacco use information.

CDC (National Center for Health Statistics' mortality report):

<http://www.cdc.gov/nchs/about/major/dvs/mortdata.htm>

NAACCR: <http://www.naacr.org/>

NCI: <http://www.cancer.gov> and the SEER Homepage: <http://www.seer.cancer.gov>. Go to <http://www.cancercontrol.cancer.gov/tcrb> for tobacco-related information.

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